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A review on the hydro-geomorphological consequences of terrace abandonment in Mediterranean landscapes

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Traditional farming terraces are one of the most conspicuous agricultural landscapes in mountain regions of the Mediterranean basin. Spreading out from Asia, first terraces in the Mediterranean countries date back from the Bronze Age and the Roman period, reaching their greatest extent in the 18th and 19th centuries. Under optimum management, these systems help to protect the soil by increasing infiltration and decreasing sediment production. However, traditional management and cultivation has ceased on many terraced landscapes during the 20th century, with variable results. Detailed bibliographic exploration across over 40 experimental and/or observational studies was carried out to review the main consequences of land abandonment of Mediterranean farming terraces on local hydrological and geomorphological processes. This review provides critical information about influencing key factors, affecting local environmental conditions, and resulting impacts. Severe geomorphological problems, in the form of surface erosion, piping and gullying, occurred under special climatic (semiarid, arid climate), lithologic (dispersive marls) and topographic (high gradient) conditions. Dense colonization of vegetation proved to be of major importance for controlling surface erosion in abandoned traditional farming terraces. Vegetation, however, hardly mitigated the risk of mass movements, which typically occurred in the form of bank terrace failure and landsliding in well vegetated terraces that were characterized by high topographic gradients and the presence of impermeable bedrocks, providing slip zones that favor mass movements during extreme rainfall events. Climate change and its effects, regarding increasing drought frequency and the incidence of extreme events, may exacerbate the hydrological and geomorphological vulnerabilities of abandoned traditional terraces in the Mediterranean region. Future management and surveillance strategies will therefore be necessary to mitigate negative impacts.